

REMARKS

Applicant respectfully requests reconsideration of this application. Claims 1, 3-10, and 31-37 are pending. No claims have been amended, cancelled, or added. Therefore, claims 1, 3-10, and 31-37 are now presented for examination.

Claim Rejection under 35 U.S.C. §102**Rinella, et al**

The Examiner rejected claims 1, 4, 6, and 7 under 35 U.S.C. 102(e) as being anticipated by U.S. Patent Application No. 6,787,899 of Rinella, et al. ("Rinella").

Claim 1 reads as follows:

1. A microelectronic device comprising:
a die, the die comprising a first side, a second side, and an edge;
a first plate, the first plate coupled with the die, the first plate exerting force on the die to modify the effective coefficient of thermal expansion of the die; and
a package, the die being coupled with the package.

This claim includes a first plate, with "the first plate exerting force on the die to modify the effective coefficient of thermal expansion of the die". It is respectfully submitted that Rinella is irrelevant to the claim because Rinella is unrelated to modification of a coefficient of thermal expansion. Rinella does not discuss thermal expansion in any manner.

Rinella concerns certain varieties of integrated circuits. Specifically, Rinella relates to an integrated circuit package having a structure to provide for heat dissipation from a die to an integrated heat spreader through a high capacity thermal interface.

In discussing the claims, the Office Action cites to element 102, a die, of Rinella both as a die and as a first plate coupled with the die. However, there is also a reference to element 120, described in Rinella as "combination mold plate and integrated heat spreader", and Applicant assumes that the heat spreader element 120 is intended as the first plate. However, it is respectfully submitted that such element is not relevant to the claims. The heat spreader does not provide for "exerting force on the die to modify the effective coefficient of thermal expansion of the die". The heat spreader is a device that is intended to dissipate heat from a device and to serve as a mold for the injection of a thermal interface. There is no discussion in Rinella that relates to an intent to modify the effective coefficient of thermal expansion of the die.

Claim 1 relates to an exertion of force to modify the "effective coefficient of thermal expansion". Modifying the temperature of a die by dissipating heat from the die, such as accomplished by the heat spreader element in Rinella, does not affect the coefficient of thermal expansion of the die. The amount of expansion of the die could coincidentally be changed (because the temperature of the die has changed), but the coefficient of thermal expansion (relating to the how much expansion occurs as a function of temperature) is not changed.

The discussion in Rinella with regard to the technology of the invention is focused on heat dissipation. Rinella indicates that the die dissipates heat through its upper surface through a high capacity thermal interface 122 to the combination mold plate and integrated heat spreader 120. The heat spreader then includes a wall or support member that makes physical and thermal contact with the upper surface of the substrate through a thermally conductive adhesive. (Rinella, col. 5, lines 56-62) There is nothing in the discussion that relates to CTE characteristics.

Further, it is noted that the discussion of the integrated heat spreader in Rinella presents embodiments that are not intended and would not be applicable for modification of effective coefficient of heat expansion. For example, in an embodiment of the heat spreader is described as "a relatively thin sheet of thermally conductive material", which in one embodiment is copper or an alloy with a thickness of 1.5 mm, with possibly a plating of nickel. (Rinella, col. 6, lines 5-12) A thin sheet of metal would not be expected to exert any substantial force on the die. The heat spreader clearly has a different purpose and thus is not designed in a manner that would be practical for CTE modification.

In short, Rinella addresses a different kind of issue for circuits, which is the manner in which heat is dissipated from a device. In contrast, modification of the coefficient of thermal expansion relates to how much a device expands as a function of temperature changes. These are very different physical phenomena.

The remaining rejected claims 4, 6, and 7, while having other differences, are dependent claims and are allowable as being dependent on the allowable base claim.

Claim Rejection under 35 U.S.C. §103

Rinella, et al in view of Zhang, et al.

The Examiner rejected claims 3 and 8-10 under 35 U.S.C. 103 (a) as being unpatentable over Rinella in view of U.S. Patent Publication 2002/0171144 of Zhang, et al. ("Zhang").

Claims 3 and 8-10 are dependent claims and are allowable as being dependent on the allowable base claim.

Further, it is respectfully submitted that Rinella must be removed as a reference against the application pursuant to the provisions of under 35 U.S.C. §103 (c). Under the requirements of 35 U.S.C. §103 (c):

Section 103. Conditions for patentability; nonobvious subject matter. (c) Subject matter developed by another person, which qualifies as prior art only under one or more of subsections (e), (f), and (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

Qualification of References as Prior Art – The filing date of the current application is June 27, 2003, which is prior to the issuance date of Rinella. Rinella thus could qualify as prior art, if at all, only under 35 U.S.C. §102 (e), thereby bringing such references under the provisions of the above-quoted provisions of 35 U.S.C. §103 (c).

Statement of Common Ownership – On behalf of the Applicant, it is hereby submitted that the subject matter of Rinella and the invention of the present application were jointly owned by or subject to an obligation of assignment to assignee Intel Corporation at the time the claimed invention herein was made.

Co-pendency – Rinella was filed on March 12, 2002 and was issued on September 7, 2004. The current application was filed on June 27, 2003, and thus the applications were co-pending.

Applicability of Law to Present Application – Both the present application and the cited reference were filed after the November 29, 1999 effective date of the American Inventors Protection Act of 1999, making the provisions of 35 U.S.C. §103 (c) applicable to the present application.

Removal of Prior Art References - Removal of Rejection – Rinella could qualify as prior art material only under 35 U.S.C. §102 (e). For this reason, the provisions of 35 U.S.C. §103 (c) direct that the co-owned subject matter of Rinella does not preclude patentability under 35 U.S.C. §103. It is thus respectfully requested that Rinella be removed as prior art references in the present application and that the rejection present in the Office Action should thus be removed.

In addition, as has already been discussed in the prior response, Zhang is not relevant to the claims. Zhang does not provide for a plate exerting forces on a die to modify its effective coefficient of thermal expansion (CTE). Zhang describes a grid array package with a heat spreader. (Zhang, e.g. ¶0002) The heat spreader is intended to improve the thermal and electrical performance of a package. (Zhang, ¶¶0013, 0053) As was previously stated in the prior response, Zhang is concerned with thermal and electrical performance, not with affecting the CTE of the die.

As has also been explained previously, Zhang mentions CTE in paragraph 0065, but in a completely different context:

[0065] In an embodiment, stiffener or ring 502 is attached to the top surface of substrate 104. Ring 502 may be attached to substrate 104 by a laminate or adhesive 510. Encapsulant 116 is filled in and flushed to ring 502 after the attachment of ring 502. Ring 502 is preferably made of a metal, such as copper or aluminum, or a combination thereof, but may also be constructed from other applicable materials. *Preferably, ring 502 is made from the same material as heat spreader 504, to minimize the mismatch of the thermal expansion coefficients.* Ring 502 is preferably flush with the outer edges of substrate 104 to form an outer edge of the BGA package, but may also reside entirely within or partially outside an outer profile of substrate 104.

(emphasis added) Zhang is indicating that a ring 502 may be attached to the top surface of the substrate, and that it is preferable to match the CTE of the ring and the heat spreader. Therefore, Zhang is only suggesting that the CTE values of these structures that are added to the die should match. The provisions in Zhang have no relevance to the CTE of the die.

Therefore, Rinella (which is not usable as prior art in this case) and Zhang, alone or in combination, do not teach or suggest the elements of the claims.

Removal of Final Rejection

Applicant submits that, whether or not the claims herein are allowed, that the final rejection of this application should be removed.

The Office Action indicates that the Applicant's amendments necessitated the new grounds of rejection. However, as is shown above, the cited new ground of rejection under 35 U.S.C. § 102 (Rinella) is clearly unrelated to the claims. Further, the rejection under 35 U.S.C. § 103 (a) also relies upon Rinella, a reference that cannot be cited for this purpose against the Applicant.

Thus, it has been shown that the newly cited reference is irrelevant to the 35 U.S.C. § 102 rejection and is inapplicable (as well as irrelevant) to the 35 U.S.C. § 103 rejection. The new Office Action in fact does not contain any legitimate new grounds of rejection in response to amendment. It is respectfully submitted that the finality of the rejection should be removed.

Conclusion

Applicant respectfully submits that the rejections have been overcome by the foregoing remarks, and that the claims thus are in condition for allowance. Accordingly, Applicant respectfully requests the rejections be withdrawn and the claims be allowed.

Docket No: 42P16889
Application No.: 10/608,718

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Invitation for a Telephone Interview

The Examiner is requested to call the undersigned at (303) 740-1980 if there remains any issue with allowance of the case.

Request for an Extension of Time

The Applicant respectfully petitions for an extension of time to respond to the outstanding Office Action pursuant to 37 C.F.R. § 1.136(a) should one be necessary. Please charge our Deposit Account No. 02-2666 to cover the necessary fee under 37 C.F.R. § 1.17 for such an extension.

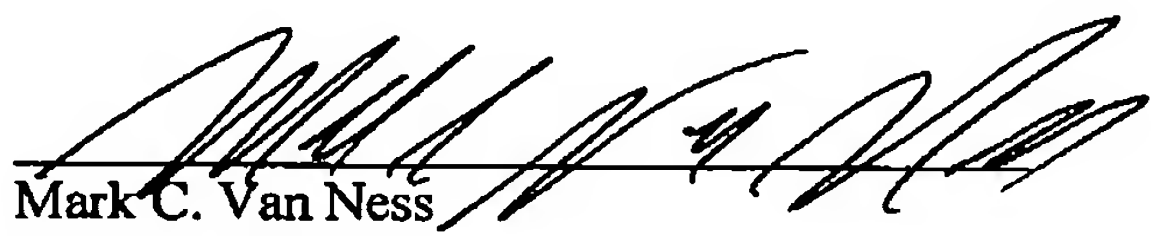
Charge our Deposit Account

Please charge any shortage to our Deposit Account No. 02-2666.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

Date: 4/5/05


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